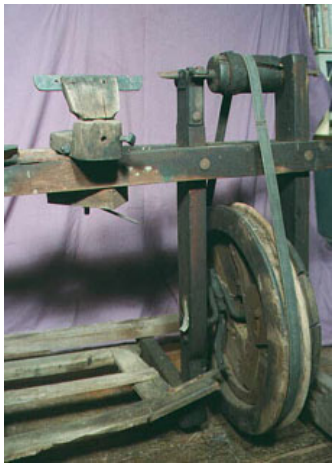
# Pre-Classroom Activities

# Activity:  Potential or Kinetic

## Article:  Reinventing the Wheel



The wheel was one of the first things man made. At first, wheels were used to move big things. It took a while to learn to use a wheel to make power. One way to do this is a flywheel. It changes energy and makes machines work. Scientists have made an even better flywheel. It is strong enough to be used by NASA!

Today, we use batteries to get most of the power we need. But, flywheels are still used. Artists use a potter's wheel to work with clay. Gears move clock hands. These are both flywheels. Think of a toy top spinning on a table. Flywheels work a lot like that.

Flywheels make electricity. It is saved until it is needed. Batteries work the same way. But, flywheels are better. They don't have acids in them. Getting hot and then cold doesn't hurt them. But, it can ruin a battery. Flywheels used to be slow. Now, they move faster, so they make more power. They can be used by hospitals and factories. They might even run cars someday!

Right now, the Station gets its power from solar arrays. They use sunlight to make electricity. Cells aim at the Sun. They catch all the light they can. This charges the Station's batteries, too. The Station uses batteries when it is in the Sun's shade. It doesn't take long for the batteries to wear out. New ones have to be sent. This costs lots of money. NASA wants to use flywheels for power. Flywheels won't wear out. They can make more power than batteries. They will save NASA time and money!

***Courtesy of NASA's Aeronautics Mission Directorate***

# Potential or Kinetic?

## *Teacher Sheet(s)*

**Objective:** To distinguish between potential and kinetic energy.

**Level:** K-4
**Subjects(s):** Science, Technology
**Prep Time:** Less than 10 minutes
**Duration:** One class period
**Materials Category:** General classroom

**National Standards:**
Science: 3c
Math:
Technology (ISTE):
Technology (ITEA): 16a

**Materials:**
- Student sheets

**Related Links:** *(none)*

**Supporting Article:**
Reinventing the Wheel

**Pre-Lesson Instruction:**
- Duplicate the Student Sheets.

**Background Information:**
Flywheels are wheels on a revolving shaft, used to regulate machinery or accumulate power. They store kinetic (potential) energy within a rapidly spinning wheel, rotor, or disk and transfer it for use when needed. In a way, they're like a non-chemical battery with a few extra advantages. Flywheels contain no acids or other hazardous materials, and they're not affected by temperature extremes the way many batteries are. Typically, flywheels have been large steel wheels, rotating at low speeds. New materials and techniques such as high-strength composites, permanent magnets, and power electronics now make it possible to use a more modern flywheel to store energy for electrical applications. Newer flywheels use a generator to spin the rotor and to convert the kinetic energy to electrical energy.

Today, flywheels provide backup power for hospitals and manufacturing plants. Flywheels are being considered for use in hybrid electric vehicles, too.

**Guidelines:**

1. Read the article “Reinventing the Wheel” to the class.
2. Discuss the reasons flywheels are being developed for use by NASA.
3. Discuss energy. You have heard of the word "energy" all your life. You eat to grow and have "energy." You go to bed early so you will have "energy" to go to school. Energy is having the power to do work. Energy is everywhere. We use it everyday. Two kinds of energy are kinetic and potential. Kinetic energy is the energy of motion. Potential energy is stored energy. A frog sitting on a lily pad is an example of potential energy. The frog leaping is an example of kinetic energy.
4. Talk about flywheels. Flywheels store energy until it is needed. They turn potential energy into kinetic energy.
5. Distribute the Student Sheets. Have students decide if the picture shows potential or kinetic energy.

**Discussion / Wrap-up:**

- Check the Student Sheets orally.

**Extensions:** *(none)*

# Potential or Kinetic?

***Student Sheet(s)***

Circle the correct answer.

| | |
|---|---|
| Potential Kinetic  | Potential Kinetic  |
| Potential Kinetic  | Potential Kinetic  |
| Potential Kinetic   | Potential Kinetic  |